Ag ALLOY FILM FOR ELECTRONIC PARTS AND SPUTTERING TARGET MATERIAL FOR FORMING Ag ALLOY FILM

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Abstract of **JP 2003113433 (A)**
PROBLEM TO BE SOLVED: To provide a Ag alloy film for electronic parts, which has a low electroresistance, high reflectivity improved hillock resistance, heat resistance, corrosion resistance and adhesion to a substrate and to provide a sputtering target material for forming the Ag alloy film. SOLUTION: The Ag alloy film for the electronic parts includes one or more elements selected among Sc, Y, Sm, Eu, Tb, Dy, Er, or Yb, of 0.1-2 atom.% in total, further one or two elements from Cu and Au, of 0.1-3 atom.%, and the balance substantially Ag. The Ag alloy film among the above films for the electronic parts, includes 0.1-2 atom.% Cu selected from the above Cu and Au. Alternatively, the Ag alloy film for the electronic parts includes 0.1-3 atom.% Au selected from the above Cu and Au.; The sputtering targets for forming the Ag alloy film for the electronic parts has the same compositions as the above films.

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[Claim(s)]
[Claim 1]An Ag alloy film for electronic parts becoming a 0.1-3at% hidden remainder real target from Ag about one sort or two sorts of elements among Cu and Au 0.1 - 2at% in total in one or more sorts of elements chosen from Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb.
[Claim 2]choosing Au to Cu and Cu -- Cu -- 0.1 - 2at% -- the containing Ag alloy film for electronic parts according to claim 1.
[Claim 3]choosing Cu and Au to Au -- Au -- 0.1 - 3at% -- the containing Ag alloy film for electronic parts according to claim 1.
[Claim 4]A sputtering target material for Ag alloy film formation becoming a 0.1-3at% hidden remainder real target from Ag about one sort or two sorts of elements among Cu and Au 0.1 - 2at% in total in one or more sorts of elements chosen from Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb.
[Claim 5]choosing Au to Cu and Cu -- Cu -- 0.1 - 2at% -- the containing sputtering target material for Ag alloy film formation according to claim 4.
[Claim 6]The sputtering target material for Ag alloy film formation according to claim 4 by which choosing Cu and Au to Au and Au being included 0.1 to 3 at.

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention, for example A liquid crystal display (following, LCD), a plasma display panel. (The following, PDP), a field emission display (following, FED), plane display devices (a flat PANERUDE spray.), such as an electrophoresis type display used for electroluminescence (following, EL), electronic paper, etc. In [in addition to FPD] thin film electronic parts, such as various semiconductor devices, a thin film sensor, and a magnetic recording head, In addition to low electric resistance or a high

optical reflectance, it is related with the Ag alloy film for electronic parts and the sputtering target material for Ag alloy film formation of which corrosion resistance, a heat-resisting property, and adhesion are required.
[0002]
[Description of the Prior Art]FPD(s), such as LCD and PDP which create a thin film device on a glass substrate, and ****EL**********, Pure metal films or those alloy films, such as a pure Cr film which is metal which is excellent in corrosion resistance, a heat-resisting property, and adhesion with a substrate from the former, a pure Ta film, and an unalloyed ti film, are used for the electric wiring film used for the magnetic recording head etc. which form an element on a thin film sensor and a ceramic substrate, and the electrode. In recent years, the above metal membranes for thin film devices require the low resistance metal membrane. In particular, in the field of FPD, although the thin-film transistor (TFT) method in which enlargement, highly-minute-izing, and a high-speed response are possible is adopted widely, the wiring film has the demand of low-resistance-izing, in order to prevent signal delay. For example, in the wiring used for large-sized color LCD of 12 inches or more used for a notebook computer etc., specific resistance. [below 30microomegacm] With 10 or less microomegacm, and a future liquid crystal television and Personal Digital Assistant as which a high definition is required more, the further low resistance metal membrane is demanded of 15-inch still more large-sized desktop PCs.
[0003]for this reason, Cr which was excellent in these wiring films at corrosion resistance or adhesion and Ta -- the aluminum alloy which added Ti, Ta, Nd, etc. is used more for aluminum which is low resistance further from that alloy Mo of low resistance, the alloy film of W, and now.
[0004]A development also has few hillocks by heating of the process at the time of especially an aluminum-Nd alloy being excellent in corrosion resistance, a heat-resisting property, and adhesion, and manufacturing a thin film device, It is known that it is a metal membrane which has the characteristics where specific resistance can be decreased to about 5 microomegacm by performing heat-treatment at not less than 250 **, etc. with 15microomegacm although it is high, and which were excellent where membranes are furthermore formed on the substrate of a room temperature.
[0005]In addition, the metal membrane formed with the aluminum alloy has the feature that the reflectance of a visible light range is very high. Therefore, although the reflective liquid crystal display which uses outdoor daylight efficiently in recent years, and does not use backlight fundamentally in LCD which is the representation of FPD, the transflective type liquid crystal display which combined the penetrated type and the reflected type further, etc. are developed, It has been mostly used also to the reflection film used for such a reflected type display.
[0006]However, even if it is the metal membrane formed with the aluminum alloy, it cannot be said that it is enough in order to realize, improvement in the high-speed response corresponding to the further highly-minute-izing demanded on a future large-sized display, the display for portable devices, etc., and an animation, and. In addition, heat-treatment is required to obtain a low resistance wiring film with an aluminum alloy like previous statement, and since sufficient heat-treatment cannot be performed when a resin substrate, a resin film, etc. are used, the fault of being difficult to get also has low resistance. Therefore, it changes to an aluminum alloy and application of Ag which is low resistance further is considered. Ag is superior to aluminum also in a reflectance. In recent years, the liquid crystal display is asked for flat reflective characteristics by the high reflection and visible light range which are called a paper white to a reflection film for low power consumption and display improved quality, and application of Ag

which is excellent in a reflectance also in the use of a reflection film is considered.

[0007]

[Problem to be solved by the invention]Although a reflection film and specific resistance have characteristics better than aluminum and an aluminum alloy, the metal membrane formed by Ag as mentioned above has the low adhesion over a substrate, and has the development of the hillock resulting from a stress, and the fault that a heat-resisting property and corrosion resistance are still lower. For example, when Ag is used as the wiring film or reflection film of FPD, the problem that membranous adhesion is low and peeling arises in a process to the glass which is a substrate, a resin substrate and a resin film, and a corrosion-resistant high metallic foil, for example, stainless steel foil etc., is produced.

[0008]According to the heating process at the time of manufacture of a display, etc., a hillock occurs like aluminum and the smooth nature of a membrane surface falls. A film condenses depending on the quality of the material and heating atmosphere of a substrate, and decline in the large reflectance by membranous continuity being lost and increase of resistance are produced. After corrosion resistance originates in a low thing and forms membranes on a substrate, it discolors only by neglecting [about] it to the air on the 1st, and becomes reflective characteristics which are tinged with the yellow taste. It was corroded by the drug solution used at the time of manufacture of a display, and there was a problem which causes decline in a reflectance and the rise of resistance sharply.

[0009]In order to solve the above-mentioned problem, to JP,H9-324264,A, Au 0.1 - 2.5at%, Cu -- 0.3 - 3at% -- in JP,H11-119664,A Ag on a glue line, [the alloy to add] [Pt and] the alloy and JP,2001-192752,A which add Pd, Au, Cu, and nickel -- Ag -- Pd -- 0.1 - 3wt%, aluminum, Au, Pt, etc. -- 0.1 - 3wt% -- the alloy to add is proposed.

[0010]However, when an element is added by the method indicated by these, producing the increase in resistance and decline in a reflectance, especially the reflectance by the side of the low wavelength of a visible light range etc. cannot obtain low resistance, a high reflectance, adhesion, hillock tolerance, and the alloy film with which it can be satisfied of corrosion-resistant and heat-resistant all. If Pd, Pt, and nickel are added 0.2% or more, a reflectance will fall, and if content exceeds 1at% further, specifically, specific resistance will exceed 5microomegacm, for example. When Au and Cu are added, there are few decline in a reflectance and increases in resistance, but there is a problem in a heat-resisting property and adhesion.

[0011]the Ag alloy system electronic parts which have electric resistance with the low purpose of this invention, a high reflectance, hillock tolerance, a heat-resisting property, corrosion resistance, and the adhesion to a substrate -- public funds -- it is in providing a group film.

[0012]

[Means for solving problem][by carrying out compound addition of the element chosen as Ag, and considering it as an Ag alloy film, as a result of inquiring wholeheartedly so that this invention persons may solve above-mentioned SUBJECT] Corrosion resistance was improved without spoiling greatly the high reflectance which Ag originally has, and low electric resistance, it found out that the adhesion to a substrate was also further improvable, and this invention was reached.

[0013]That is, this invention is an Ag alloy film for electronic parts which becomes a 0.1-3at% hidden remainder real target from Ag about one sort or two sorts of elements among Cu and Au 0.1 - 2at% in total in one or more sorts of elements chosen from Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb. under the present circumstances -- choosing Au to Cu and Cu -- Cu -- 0.1 - 2at% -- choosing containing or Cu, and Au to Au --

Au -- 0.1 - 3at% -- containing is preferred.

[0014]Another this invention is a sputtering target material for Ag alloy film formation which becomes a 0.1-3at% hidden remainder real target from Ag about one sort or two sorts of elements among Cu and Au 0.1 - 2at% in total in one or more sorts of elements chosen from Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb. under the present circumstances -- choosing Au to Cu and Cu -- Cu -- 0.1 - 2at% -- it is preferred that choose to contain or Cu, and Au to Au, and Au is included 0.1 to 3 at.

[0015]

[Mode for carrying out the invention][the important feature of the Ag alloy film for electronic parts of this invention] One or more sorts of elements chosen from Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb, Among Cu and Au, about one sort or two sorts of elements [a proper quantity of], every, while it compounds, and it contains and this controls the increase in resistance, and a fall and film peeling of a reflectance, it is the point of having improved the adhesion over a substrate, and corrosion resistance.

[0016]Below, the Ag alloy film for electronic parts of this invention explains Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb, and in total explains the Reason for making content of one sort or two sorts of elements into 0.1 - 3at% in total among Cu and Au further 0.1 - 2at%. First, the corrosion resistance of the Ag alloy film for electronic parts improves by containing Sc, Y, Sm, Eu, Tb, Dy, Er, and Yb. However, less than [0.1at%], there is no corrosion-resistant improvement effect, and on the other hand, content will produce the increase in resistance of what [excellent], and decline in a reflectance in corrosion resistance, if 2at% is exceeded. Therefore, the content may be 0.1 - 2at%. It is 0.2 - 1at% preferably.

[0017]The development of a hillock can be reduced by containing one sort or two sorts of elements, Cu and Au, added simultaneously. However, if total content does not have a depression effect of a hillock less than [0.1at%] and exceeds 3at% on the other hand, the rise of resistance and the reflectance by the side of the low wavelength of a visible light range will fall. Therefore, the content may be 0.1 - 3at%. It is containing Cu at 0.1 - 2at% among elements, and containing 0.1 - 3at% for Au independently among Cu and Au, preferably, and it becomes possible to obtain a higher reflectance and the low resistance Ag alloy film for electronic parts.

[0018]Maintenance of the low resistance by content of the above-mentioned element group of this invention and a reflectance or the Reason for improvement is not clear. However, the alloying element of Sc, Y, Eu, Sm, Tb, Dy, Er, and Yb which were selected by this invention tends to form Ag and a compound, controls the intergranular corrosion of Ag by depositing to a grain boundary, and raises a resistance to environment. A melting point is still higher than Ag, by adding Cu easily mixed with Ag, and Au, atomic diffusion can be delayed and the development of a hillock can be controlled. [0019]That is, the development and condensation of HIRROKU by a deposit of the compound of Ag and Sc in a grain boundary, Y, Sm, Eu, Tb, Dy, Er, and Yb and unusual growth of the grain accompanying [when Cu and Au stagnate in a grain] movement of the atom in a heating process are controlled, and a heat-resisting property improves. Since it becomes detailed and smooth surface type voice from uneven-shape-izing and the development of the void by it being controlled in addition to the ability to control grain growth, the increase in resistance and decline in a reflectance can also be controlled. To improve adhesion is considered by the effect that membrane stress is reduced by addition of these elements, and the effect of both condensation inhibition.

[0020]Usually, in the film formed by sputtering etc., the element added dissolves by super saturation in a matrix. That is, since an alloying element invades between crystal lattices at super saturation, the lattice is

confused, and since a motion of a free electron is checked, resistance increases. [on the other hand the thing which the compound of Sc, Y, Sm, Eu, Tb, Dy, Er and Yb which are alloying elements, and Ag does for a grain boundary deposit in the case of this invention] The inside of Ag grain is considered to be the Reason resistance also with low becoming an Ag independent or Ag, and the organization where Cu with a near crystal lattice and Au dissolved, and a motion of a free electron not being checked, either is maintainable.
[0021]As for the Ag alloy film for electronic parts of this invention, in order to obtain the stable resistance and reflectance, it is preferred to be referred to as 50-300 nm as thickness. Membranous surface type voice changes easily that it is less than 50 nm, and resistance increases. When it furthermore uses for a plane display device, in order that light may penetrate, a reflectance falls. On the other hand, although resistance and a reflectance do not change a lot that it is the thickness over 300 nm, while becoming easy to separate by membrane stress, when forming a film, time is taken and productivity falls.
[0022]When forming the Ag alloy film for electronic parts of this invention, sputtering using a target material is the optimal. it is because the film of the presentation can be mostly formed with a target material by the sputtering method -- the electronic parts of this invention -- public funds -- it becomes possible to form stably the Ag alloy film which is a group film. For this reason, another this invention is a sputtering target material for Ag alloy film formation which has the same presentation as the Ag alloy film for electronic parts of this invention.
[0023]What is necessary is just to be able to attain a high grade, a uniform organization, high density, etc. which are generally required of a target material, although it is variously about the manufacturing method of a target material. For example, after hardship useful opening adjusts in a predetermined organization, it casts to metal molds, tabular is further processed by forging, rolling, etc. after that, and it can manufacture by making the target of predetermined shape by machining.
[0024]A thin film can be formed by sputtering and what is necessary is for a resin substrate, a metal substrate, other resin foil, a metallic foil, etc. to be just used although it is preferred to use a glass substrate and a Si wafer as a substrate used when forming the Ag alloy film for electronic parts of this invention.
[0025]
[Working example]The ingot was created with the vacuum melting process so that it might become substantially the same as that of the target system of the Ag alloy film which is a metal membrane for electronic parts, after processing tabular by cold rolling, the target material was produced, and the target material (100 mm in diameter and 5 mm in thickness) was produced by machining. using the target material -- sputtering -- a glass substrate or Si-wafer top -- the electronic parts of 200 nm of thickness -- public funds -- the Ag alloy film which is a group film was formed, and as membrane characteristics, specific resistance used 4 terminal method, the reflectance used the optical reflectometer, and it measured.
[0026]the electronic parts which produced [above-mentioned] in order to evaluate change of membrane characteristics after passing through the manufacturing process as predetermined products -- public funds -- the following conditions estimated the Ag alloy film which is a group film. characteristics after evaluating the specific resistance after giving heat-treatment of 2 hours in the temperature of 250 **, and a nitrogen gas atmosphere as heat-resistant evaluation, and a reflectance and neglecting 24h in the air of the temperature of 80 **, and 90% of humidity as an environment nature evaluation test -- and, the metal membrane which gave the above-mentioned heat-resistant evaluation as a process evaluation examination -- Tokyo -- adaptation -- make OFPR-800 resist being formed with a spin coat, and, [a resist] Negatives were

developed after exposing a resist by ultraviolet radiation organic alkali developer NMD-3 using the photomask, the resist pattern was produced, and the reflectance of the portion without a resist pattern was measured again. Then, it etched with the mixed liquor of phosphoric acid, nitric acid, and acetic acid, metal membrane wiring was created, the resistance was measured, and it asked for specific resistance.

[0027]In order to evaluate membranous adhesion, Scotchtape was stuck on the surface of the metal membrane which heat-treated, and the area at the time of tearing off in the direction of 45 degrees of slant was denoted by the area rate per 20-cm^2, and was evaluated as adhesion power. The result which more than measured is shown in Table 1 and Table 2.

[0028]

[Table 1]

No	組成(at%)	成膜時 反射率(%)	成膜時 比抵抗 μΩcm	熱処理後 反射率(%)	熱処理後 比抵抗 μΩcm	環境試験後 反射率(%)	環境試験後 比抵抗 μΩcm	プロセス試験後 反射率(%)	プロセス試験後 比抵抗 μΩcm	密着性(%)	区分
1	Ag	99.5	2.5	70	9.7	86	3	82	10.5	50	比較例
2	Ag- 0.1 Sm- 0.50 Cu	99.1	2.6	93.8	2.7	96.6	3.1	94.3	3.2	80	本発明例
3	Ag- 0.5 Sm- 1.00 Cu	98.5	2.9	96.6	3.1	97.4	3.4	96.8	3.5	80	本発明例
4	Ag- 2.5 Sm- 2.00 Cu	92.8	4.5	92.2	5.3	92.4	5.4	92.3	5.2	85	比較例
5	Ag- 0.5 Dy- 0.30 Cu	98.9	2.9	96.0	3.1	96.6	3.5	96.5	3.5	80	本発明例
6	Ag- 0.3 Dy- 1.00 Cu	98.6	2.7	96.2	2.8	97.4	3.3	96.5	3.4	85	本発明例
7	Ag- 2.0 Dy- 3.00 Cu	94.5	4.4	94.0	4.8	94.2	4.8	94.0	5.0	90	本発明例
8	Ag- 0.2 Er- 0.50 Cu	99.0	2.7	94.8	2.7	96.7	3.2	95.3	3.4	85	本発明例
9	Ag- 2.0 Er- 1.50 Cu	96.3	4.1	95.7	4.7	95.8	4.9	95.8	4.8	90	本発明例
10	Ag- 1.5 Er- 0.45 Cu	98.0	3.7	96.9	4.2	96.9	4.4	97.1	4.4	85	本発明例
11	Ag- 0.5 Er- 3.20 Cu	94.3	3.5	93.4	4.3	93.9	4.2	93.5	4.9	90	比較例
12	Ag- 2.5 Er- 0.20 Cu	94.8	4.5	94.0	5.3	93.9	5.4	94.2	5.2	75	比較例
13	Ag- 1.5 Sc- 1.50 Gd	95.0	4.9	94.4	5.4	94.5	5.9	94.3	5.6	65	比較例
14	Ag- 1.0 Y- 0.30 Tb- 0.2 Cu	97.8	3.4	96.7	3.8	96.7	4.0	96.7	4.2	85	本発明例
15	Ag- 0.2 Dy- 0.20 Eu- 1 Cu	98.1	2.7	96.3	2.8	96.4	3.2	96.4	3.4	85	本発明例
16	Ag- 1.1 Yb- 1.00 Er- 1.0 Cu	94.4	3.6	93.7	4.2	93.8	5.5	93.8	5.1	90	比較例
17	Ag- 1.5 Sm- 0.45 Cu- 1.0 Au	97.5	4.0	96.5	4.4	96.6	4.8	96.7	4.7	85	本発明例
18	Ag- 1.5 Pd- 1.50 Cu	94.0	4.0	89.0	4.9	92.0	6.4	88.0	5.6	85	比較例
19	Ag- 1.5 Cu- 1.50 Au	98.5	3.1	84.8	5.5	89.5	5.0	93.0	7.7	80	比較例
20	Ag- 0.5 Cu	99.3	2.6	82.3	5.6	86.4	5.5	94.2	7.2	70	比較例
21	Al- 1.5 Nd	98.5	15.0	92.0	7.0	94.5	16.2	95.4	7.2	80	比較例

[0029]

[Table 2]

No	組成(at%)	成膜時 反射率 (%)	成膜時 比抵抗 μΩcm	熱処理後 反射率 (%)	熱処理後 比抵抗 μΩcm	環境試験後 反射率 (%)	環境試験後 比抵抗 μΩcm	プロセス試験後 反射率 (%)	プロセス試験後 比抵抗 μΩcm	密着性 (%)	区分
22	Ag- 0.1 Y- 0.10 Au	99.4	2.6	87.5	2.7	88.4	3.1	90.3	3.3	80	本発明例
23	Ag- 0.3 Y- 0.30 Au	99.1	2.7	95.1	3.0	89.2	3.3	96.1	3.4	80	本発明例
24	Ag- 0.1 Sc- 0.60 Au	99.4	2.6	95.6	2.7	93.0	3.1	93.1	3.3	80	本発明例
25	Ag- 0.2 Sm- 0.50 Au	99.2	2.7	95.6	2.8	94.6	3.2	95.2	3.4	85	本発明例
26	Ag- 0.5 Sm- 2.00 Au	98.8	2.9	97.8	3.3	97.3	3.5	97.4	3.6	90	本発明例
27	Ag- 0.1 Dy- 2.80 Au	99.4	2.6	98.4	2.7	89.2	3.1	96.7	3.3	85	本発明例
28	Ag- 0.2 Dy- 3.00 Au	99.2	2.7	98.4	2.8	97.5	3.2	97.2	3.4	85	本発明例
29	Ag- 0.5 Dy- 2.00 Au	98.8	2.9	97.8	3.3	97.3	3.5	97.4	3.6	85	本発明例
30	Ag- 1.0 Dy- 1.00 Au	98.2	3.3	97.0	4.1	97.0	4.0	97.3	4.0	90	本発明例
31	Ag- 1.5 Dy- 1.00 Au	97.5	3.7	96.6	4.9	96.7	4.4	96.9	4.4	90	本発明例
32	Ag- 2.0 Er- 0.50 Au	96.8	4.1	96.0	5.7	96.2	4.9	96.4	4.8	95	本発明例
33	Ag- 0.5 Er- 0.10 Au	98.8	2.9	89.0	3.3	96.1	3.5	92.2	3.6	85	本発明例
34	Ag- 0.5 Er- 1.00 Au	98.8	2.9	97.2	3.3	96.8	3.5	97.2	3.6	85	本発明例
35	Ag- 0.5 Er- 2.80 Au	98.8	2.9	98.0	3.3	97.5	3.5	97.6	3.6	90	本発明例
36	Ag- 1.5 Er- 0.45 Au	97.5	3.7	96.4	4.9	96.6	4.4	96.9	4.4	90	本発明例
37	Ag- 2.0 Tb- 0.45 Au	96.8	4.1	95.9	5.7	96.2	4.9	96.4	4.8	95	本発明例
38	Ag- 2.5 Tb- 0.50 Au	93.7	4.5	93.0	6.5	93.1	5.4	93.3	5.2	85	比較例
39	Ag- 1.0 Yb- 3.50 Au	94.0	3.3	93.6	4.1	93.5	4.0	93.5	4.0	90	比較例
40	Ag- 3.0 Yb- 0.20 Au	93.9	4.9	93.2	7.3	93.4	5.9	93.5	5.6	90	比較例
41	Ag- 0.3 Sm- 0.50 Eu	93.5	2.7	88.0	3.0	90.8	3.3	90.8	3.4	75	比較例
42	Ag- 0.3 Dy- 0.30 Er- 0.2 Au	96.7	2.7	95.3	3.0	94.5	3.3	94.9	3.4	85	本発明例
43	Ag- 0.2 Sm- 0.20 Cu- 0.4 Au	97.3	2.7	96.0	2.8	94.8	3.2	95.2	3.4	85	本発明例
44	Ag- 0.3 Er- 1.00 Au- 0.5 Cu	97.1	2.7	96.1	3.0	96.1	3.3	96.1	3.4	95	本発明例

[0030]Although a pure Ag film has resistance of 2.5microomegacm, and a reflectance of 99% at the time of membrane formation, when heat treatment and an environmental test are done, resistance is sharply understood that adhesion is low while increasing and a reflectance's falling. The specific resistance at the time of membrane formation of an aluminum-Nd alloy is high, and it turns out that a reflectance is low. Although the specific resistance after heat treatment falls, the value is as high as 5 or more microomegacm. Sc, Y, Eu, Sm, Tb which are rare earth elements on the other hand at Ag of this invention, [one or more sorts of elements chosen from Dy, Er, and Yb, and the Ag alloy film which contains one sort or two sorts of

elements among Cu and Au] Although specific resistance is higher than Ag and a reflectance is slightly low at the time of membrane formation, even if specific resistance and a reflectance are good and do an environmental test and a process examination after heat treatment rather than an aluminum-Nd alloy, there are little increase in resistance and decline in a reflectance, and it turns out that adhesion is improved sharply. It turns out that it is improving, so that the effect has many amounts of addition. It becomes clear [the improvement effect] at more than each amount of addition 0.1at%, and sufficient reflectance is maintained even after doing each examination.

[0031]However, even though there is little decline in the reflectance after each examination when the amount of addition increases, the reflectance at the time of membrane formation falls, and the high reflectance of not less than 95% becomes difficult to get. If, as for Sc, Y, Eu, Sm, Tb, Dy, Er, and Yb which are rare earth elements, the sum total exceeds 2at%, the increase in specific resistance and decline in a reflectance will become large. If Cu and Au exceed 3%, decline in a reflectance will become large, especially Cu has the large decline in a reflectance, when 2% is exceeded, and it becomes difficult to obtain the reflectance of not less than 95%.

[0032]In order to obtain the low specific resistance of 3.5 or less microomegacm by being stabilized, Au and 0.2 - 1.0at% of Cu are [Sc, Y, Eu, Sm, Tb, Dy, Er, and Yb in which the content is rare earth elements] desirable 0.2 - 0.5at%.

[0033]

[Effect of the Invention]the electronic parts which have improved low resistance, a high reflectance, a heat-resisting property, a resistance to environment, and adhesion with a substrate according to this invention -- public funds -- it is possible to obtain a group film stably. Therefore, it is useful to plane display devices and various thin film devices, such as high definition LCD which needs low resistance, organic electroluminescence, PDP, etc. and reflected type LCD in which the low power consumption used for a Personal Digital Assistant etc. is demanded, and industrial value is high.

[Translation done.]